BAD RIVER BAND OF LAKE SUPERIOR TRIBE OF CHIPPEWA INDIANS

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Michigan Department of Environmental Quality
Water Resources Division
1420 US Highway 2 West
Crystal Falls, MI 49920

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Re: Orvana Resources US Corp Copperwood Mine Permit Applications: Wetland Protection (NREPA Part 303), Inland Lakes and Streams (Part 301), and Air Quality Permit Applications

Dear Permit Reviewers;

As a sovereign nation possessing an interest in the use and enjoyment of the sacred waters of the Lake Superior, or *Anishinaabeg-Gichigami*, pursuant to treaties we signed with the United States, we submit our comments related to Orvana Resources US Corporation's (henceforth, "Orvana" or "applicant") Copperwoood mine permit applications regarding impacts to wetlands, inland lakes and streams, and air quality.

Please note that these comments have been submitted on behalf of the Environmental Program of the Bad River Band of Lake Superior Chippewa and do not represent a form of government-to-government consultation. For each item, we will offer background information (or "context") and a subsequent comment, to which we would request a specific and relevant response. Contact information is provided at the conclusion should items exist for which you require further explanation or discussion.

Context (1): In the Part 303-301 Environmental Assessment, the Applicant repeatedly asserts that "no springs, seeps, or other sources of discharge of groundwater to the surface water system have been identified in the project area" (e.g., EA Sec. 5.7.11). The Applicant also states that "underground workings will be flooded with water from Lake Superior… Therefore, after final reclamation the water balance will return to natural conditions" (EA Sec. 6.2.1). The Applicant concludes that "following closure of the mine, no long-term impacts to surface water quality will

be present as the site will be reclaimed and returned to a natural, self-sustaining ecosystem" (EA Sec. 6.5.1). These statements indicate that, upon reviewing the available data, the Applicant does not expect the flooding of the mine with Lake Superior water at closure to be capable of impacting the surface water systems through a groundwater pathway.

However, the Applicant's own data calls these conclusions into question. Field conductivity testing indicates that the middle lacustrine/sub-glacial meltwater deposit hydrostratigraphic unit exhibits a horizontal hydraulic conductivity approximately two orders of magnitude greater than the relatively impermeable upper till (EA Sec. 5.7.7) and a consistent unit of horizontal transmission also exists at or near the overburden/bedrock interface zone (EA Sec. 6.3.1). Section 5.7.8 further describes that "...exposure of the bedrock within the streambed indicates that direct recharge to the bedrock and the interface between the bedrock and glacial overburden interface [are] more likely." Likewise, the geologic cross section (Fig. L-2) provided in Attachment L depicts a probable connection between deeply incised stream channels and the more conductive layers mentioned above. This potential groundwater-surface water interface aids in explaining the elevated (>10mg/L) chloride levels in surface water samples from Unnamed Creek and Namebinag Creek (Table 202 2 8-1 in Orvana's mine permit application); which are best explicated as evidence of groundwater inputs to the deeper incised stream channels.

The applicant also acknowledges, albeit inconsistently, the potential for interaction between groundwater, wetlands, and mine workings. The claim is made that: "the worst-case estimates of changes in groundwater discharge to wetlands are temporary because dewatering of the mine is also temporary" (Attachment L, Sec 4.1). Section 6.2.1 of the Environmental Assessment states that: "dewatering of the underground workings will increase the vertical groundwater gradient, potentially allowing for increased flow to groundwater. Fracturing due to subsidence may affect this flow."

It is unclear how one can logically assert that the riparian wetland impacts will be remedied by the reflooding of the mine, yet not acknowledge the potential impacts to surface water quality by this mine water. Rather, it seems the intuitive expectation is that the cessation of dewatering activities and the active flooding of the mine will restore the hydrological connectivity between ground- and surface-waters. While this may act to resolve water *quantity* issues in wetlands, it would also be expected to induce water *quality* issues through uncontrollable discharges to surface waters. In fact, we would expect the increased vertical hydraulic conductivity associated with fracturing and the zone of deformation following subsidence to only increase the rate of mine water discharge to the streams and wetlands on-site.

> **Comment (1.1):** Sufficient variation exists between the Applicant's statements and the data available to create marked uncertainty around the post-mine groundwater-surface water interaction component. Reasonable evidence exists that pollutants (e.g. brines, metals, etc.) may be transported by post-closure, reflooded mine water into the riparian system to create unregulated discharge(s) that degrade surface water quality. This

mandates further investigation into the effects of the proposed project on water quality and groundwater-surface water interactions.

Context (2): Water budgets in ecological applications are critical for understanding how vegetation systems may be influenced by changes in proximate factors. In this case, water balance calculations are used to determine the possible effect of dewatering on wetlands. However, there are several items which should be better explained or revaluated in order for the information provided to be useful in this context.

Comment (2.1): The description in section 5.7.13.5 of the Environmental Assessment provides absolutely no quantification or model to justify the estimate of two inches/year for groundwater flow. Rather, it seems as though the applicant selected this amount so as to ensure that the assumption of a zero net change in storage would be satisfied. In addition, this conveniently reduces the expected role of groundwater in riparian calculations. The methods for determining the value for groundwater in this section should be better explained.

Comment (2.2): The evapotranspiration metric is described as including the effect of vegetation on the rate of water loss from the system. Yet, the inputs summarized are limited to precipitation, temperature, and latitude. These are clearly metrics used to calculate a general influence of climate as driven by energy and water budgets. There is no factor mentioned which would quantify the effect of vegetation; let alone the floral communities observed on-site. This metric should be redefined as evaporation or some explanation should be given as to how vegetation was calculated into the metric.

Comment (2.3): The applicant provides water balance data at an annual scale (e.g. Table L-2, Attachment L). While this may be fine for some engineering applications, it lacks critical information for topics in physiological ecology (e.g. Stephenson 1990). Seasonal budgets should be provided to identify any possible changes during critical periods for perched and riparian wetlands (e.g. growing season).

Context (3): The Alternatives Analysis submitted by the applicant includes a discussion on eight possible options for the Tailings Disposal Facility (TDF), which is by far the facility expected to have the greatest impact on wetlands and streams. However, 5 of the 8 alternatives considered retain the preferred TDF configuration and simply move its location. These options included enough information on itemized costs, materials, site features, and aesthetics to imply some level of serious consideration.

But, those alternatives which do not fit into some *a priori* format received cursory and superficial evaluation, at best. In particular, alternative 1 (the only alternative to consider backfilling of the mine) offers a less impactful and cheaper option to permanent storage of all tailings above ground. However, the Applicant never expends the effort to reconsider operations within the mine plan which would facilitate this reasonable, and less impactful, alternative.

It should also be noted that backfilling may offer additional benefits; including: reducing subsidence, containing highly-saline groundwater, reducing geochemical reactions of concern, restricting pollutant transport pathways (see comment 1), and decreasing the long-term, surficial footprint of the operation.

> **Comment (3.1):** Alternatives to the preferred option have not been articulated or evaluated in a serious manner. Moreover, reasonable effort has not been expended by the applicant in order to avoid and minimize impacts to wetlands and streams prior to pursuing mitigation options. The applicant should be expected to reevaluate their alternatives; to include a more professional analysis of the option to backfill a proportion of their tailings (i.e. alternative 1).

Context (4): In section 5.0 of the Applicant's Wetland Mitigation Plan, it states: "The MiRAM (Michigan Rapid Assessment Method) data will be used to design the created wetlands in an effort to best attain functional replacement of wetlands." The Applicant then proceeds to describe locations, acreage, and methods for the mitigation of wetlands on-site.

> **Comment (4.1):** While we recognize the value of mitigating wetlands on-site, the appropriate mitigation of impacted wetlands should not be identified, proposed, or permitted without site-specific data on impacted wetland functions. These data should, in turn, be used to identify goals and objectives stated in terms of functions and values; such as vegetative diversity, fisheries/wildlife habitat, flood conveyance/storage, rare or threatened and endangered species habitat, etc.

> **Comment (4.2):** Preliminary plans with references to future data collection and revisions should not be accepted as complete applications. We refer you to comment 6.1 below for further discussion on this issue.

Context (5): The new 1-hour nitrogen (NO_2) National Ambient Air Quality Standard (NAAQS; effective April 12, 2010) defines the 1-hour NAAQS relative to ambient concentrations of NO_2, whereas the majority of the nitrogen oxides (NOx) emissions from stationary and mobile sources are in the form of nitric oxide (NO) rather than NO_2. The NAAQS Analysis Results listed in Table 6 of the Air Quality Impact Assessment for the Orvana Resources Copperwood Project demonstrates that Tier 2 modeling for NO_2 will be approaching the NAAQS during the stated "worst-case" scenarios. In addition, significant levels and impacts are noted throughout the Air Quality Impact Assessment of NO_2 and NO_2 as Nox.

> **Comment (5.1):** Given such potentially high emission levels of NO_2, Tier 3 modeling in AERMOD using detailed screening methods and site-specific NO_2/Nox ratios, supported by ambient measurements, would clarify how expected emissions may approach or violate the NAAQS in addition to providing an opportunity for real-time monitoring.

Context (6): As mentioned previously, the Applicant has indicated that in the future a rapid functional assessment of wetlands will be conducted to inform the Final Wetland Mitigation Plan.

In addition, in the Michigan Department of Environmental Quality's (MDEQ) response to public comments on Orvana's mine permit application there are repeated references to a future determination by MDEQ about the design conditions of the Tailings Disposal Facility.

> **Comment (6.1):** The habitual reference to future sources of information which are critical to the informed review of a project, but not available prior to soliciting public comment, is insufficient. Such practices neither satisfy the expectation that an agency keep the public informed, nor does it provide for meaningful public participation in the regulatory process. Comment periods should not be initiated and permits should not be granted until all pertinent information has been provided by the applicant and made available for public review.

We thank you for your time and consideration. We look forward to your response.

Respectfully,

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CITATIONS:

Stephenson, N.L. 1990. *Climatic Control of Vegetation Distribution: the Role of the Water Balance*. The American Naturalist 135(5): 649-667.